

Amendments to the Specification

[0025] When pump 10 is not in use, stationary molten metal in the pump may cool and "freeze" within the pump's internal flow passages. To prevent this from happening, a cyclical emptying and filling of riser annular volume [46] 44 with molten metal may be electromagnetically accomplished. Reversing the direction of all phase vectors in FIG. 4(b) will create a magnetic force on molten metal in riser annular volume [46] 44 that will force it down and push molten metal back through inlet 24 to the source of molten metal connected to the inlet. Subsequently reversing all phase vectors back to the directions shown in FIG. 4(b) will create a magnetic force that will cause molten metal to rise up in the riser annular volume. This jogging motion of molten metal will prevent freezing of molten metal in the pump when it is not in use. In other examples of the invention, if a three phase power supply is used, cyclically reversing two of the phases with, for example, solid state switches, can also be used to accomplish the electromagnetic jogging motion of melt in the pump. In other examples of the invention, a heating medium, such as a circulating hot gas or liquid, or an electric heating element, may be provided in the volume between thermal insulator 26 and the outer wall of outer tube 28.

[0026] FIG. 5 illustrates another example of an electromagnetic pump of the present example. In this example, inlet 24a is at the bottom of the pump and molten metal is electromagnetically pumped directly up riser annular volume [46] 44 as generally described in previous examples of the invention. In this particular example since molten metal does not flow through the inner tube, the inner tube may be a totally enclosed tube or other inner structural element that serves as a means for containing magnetic material 46 between the inner structural element and mid tube 34.